

REMARKS

In response to the Office Action dated July 21, 2010, Applicants respectfully request reconsideration based on the above claim amendments and the following remarks. Applicants respectfully submit that the claims as presented are in condition for allowance.

Claims 1-5 and 7-10 are pending in the present Application. Claims 1 and 10 are amended to better set forth the invention, leaving Claims 1-5 and 7-10 for consideration upon entry of the present amendment and following remarks.

Support for the claim amendments can at least be found in the specification, the figures, and the claims as originally filed. Particularly, the support for amended Claims 1 and 10 is at least found in the specification at Page 5, lines 2-5.

No new matter has been introduced by these amendments. Reconsideration and allowance of the claims are respectfully requested in view of the above amendments and the following remarks.

Telephone Interview with Examiner of Record

A telephone interview between the Examiner of Record and Applicants' undersigned attorney was completed on December 3, 2010, including a proposed amendment of:

1. A quantum dot light-emitting diode comprising:
a top electrode;
a bottom electrode disposed substantially opposite the top electrode and on a substrate including polyethyleneterephthalate or polycarbonate substrate...

As indicated during the telephone interview, and as confirmed in the Interview Summary issued by the Examiner of Record on December 8, 2010, the Examiner agreed that the amended claim appears to overcome the prior art of Bulovic (U.S. Patent Publication No. 2004/0023010) and Jain (U.S. Patent No. 6,797,412).

Claim Rejections Under 35 U.S.C. § 103

For an obviousness rejection to be proper, the Examiner is expected to meet the burden of establishing why the differences between the prior art and that claimed would have been obvious. (MPEP 2141(III)) “A patent composed of several elements is not proved obvious merely by demonstrating that each of its elements was, independently, known in the prior art.” *KSR Int’l Co. v. Teleflex Inc.*, 127 S.Ct. 1727, 1741 (2007). To find obviousness, the Examiner must “identify a reason that would have prompted a person of ordinary skill in the art in the relevant field to combine the elements in the way the claimed new invention does.” *Id.* Also, to establish *prima facie* obviousness of a claimed invention, the prior art references must teach or suggest all of the claim limitations. (MPEP 2143(A)(1))

Claims 1, 2, 4, 5, 8 and 9 stand rejected under 35 U.S.C. § 103(a) as being allegedly unpatentable over Bulovic et al. (U.S. Patent Publication No. 2004/0023010, hereinafter “Bulovic”) in view of Jain et al. (U.S. Patent no. 6,797,412, hereinafter “Jain”).

Claims 3 and 7 stand rejected under 35 U.S.C. § 103(a) as being allegedly unpatentable over Bulovic in view of Jain, and further in view of Kishigami (Japanese Patent No. 200-215984, hereinafter “Kishigami”).

Claim 10 stands rejected under 35 U.S.C. § 103(a) as being allegedly unpatentable over Bulovic in view of Kishigami.

Applicants respectfully traverse the rejections for the reasons set forth below.

Amended independent **Claims 1 and 10** similarly recite, *inter alia*:

- a top electrode;
- a bottom electrode disposed substantially opposite the top electrode and *on a substrate including a polyethyleneterephthalate or a polycarbonate substrate*;
- an inorganic quantum dot light-emitting layer provided between the top electrode and the bottom electrode; and
- an inorganic electron transport layer disposed between the inorganic quantum dot light-emitting layer and the top electrode.”

Bulovic is directed towards a light-emitting device including semiconductor nanocrystals, the device including **a substrate 1 (Glass in FIG. 2)**, a first electrode 2 (ITO in FIG. 2), a first layer 3 (a hole transporting layer TPD:QDs in FIG. 2), an organic light-emitting layer of Alq3 (shown only in FIG. 2, but discussed as being between layers 3 and 4 with respect to an alternative embodiment of FIG. 1), a second layer 4 and a second electrode 5 (Mg:Ag and Ag in FIG. 2). (See FIGS. 1-2B and the associated description thereof in the specification of Bulovic).

Therefore, Bulovic *does not teach or suggest* **a bottom electrode disposed substantially opposite a top electrode and on a substrate including a polyethyleneterephthalate or a polycarbonate substrate**, an inorganic quantum dot light-emitting layer provided between the top electrode and the bottom electrode, and **an inorganic electron transport layer disposed between the inorganic quantum dot light-emitting layer and the top electrode** of amended independent Claims 1 and 10.

On Pages 6 and 10 of the instant Office action, the Examiner asserts that Bulovic discloses all of the elements of the abovementioned claims except, *an inorganic electron transport layer*, which the Examiner further states is disclosed at least in Figure 7 and Col. 5, lines 56-59 of Jain, and in the abstract of Kishigami.

As described in the specification at page 5, lines 1-5, the substrate (10) used in the quantum dot light-emitting diode in the claimed invention may be a substrate commonly used in the art. A glass or transparent plastic substrate is preferred because of its high transparency, superior surface smoothness, easy of handling, and excellent waterproofness. Specific examples of the transparent substrate include glass, polyethyleneterephthalate, and polycarbonate substrate. Therefore, independent Claims 1 and 10 are amended to include “a bottom electrode disposed substantially opposite the top electrode and *on a substrate including polyethyleneterephthalate or polycarbonate substrate.*”

Regarding **Jain**, the substrate is made of sapphire or silicone and a thick semiconductor layer is disposed on the substrate, and thus flexible device also cannot be made by Jain, contrary to the claimed invention.

Therefore, even if the inorganic electron transport layer of Jain were used in the device of Bulovic for the purpose of enhancing the electron injection to the light emitting device and to improve the luminance efficiency of the device, as asserted in the instant Office action, the combined structure would *not teach* **a bottom electrode disposed substantially opposite a top electrode and on a substrate including a polyethyleneterephthalate or a polycarbonate substrate**, an inorganic quantum dot light-emitting layer provided between the top electrode and the bottom electrode, and **an inorganic electron transport layer disposed between the inorganic quantum dot light-emitting layer and the top electrode** of amended independent Claims 1 and 10.

Kishigami discloses an organic electroluminescent element including a cathode 2, an electron transport layer 3, an organic electroluminescent layer 4, a hole transport layer 5, an anode 6 and a substrate 7. (See Abstract, associated figure and Title of the invention). The substrate of Kishigami uses a glass or metal, and thus a flexible device cannot be implemented by Kishigami, contrary to the claimed invention.

Therefore, even if the electron transport layer of Bulovic were replaced with the inorganic electron transport layer of Kishigami for the purpose of enhancing the electron injection to the light emitting device and to improve the luminance efficiency of the device, as asserted in the instant Office action, the combined structure would *not teach* **a bottom electrode disposed substantially opposite a top electrode and on a substrate including a polyethyleneterephthalate or a polycarbonate substrate**, an inorganic quantum dot light-emitting layer provided between the top electrode and the bottom electrode, and **an inorganic electron transport layer disposed between the inorganic quantum dot light-emitting layer and the top electrode** of amended independent Claims 1 and 10.

Therefore, since Bulovic, Jain and Kishigami, alone or in combination, *fail to teach or suggest* all of the limitations of at least amended independent Claims 1 and 10, *prima facie*

obviousness does not exist regarding amended independent Claims 1 and 10 with respect to Bulovic, Jain and Kishigami. Applicants respectfully submit that Claims 1 and 10 are not further rejected or objected and are therefore allowable to Applicants. As Claims 2-5 and 7-9 variously depend from Claim 1, they are correspondingly allowable. Entry of the claim amendments, reconsideration, withdrawal of the claim rejections under 35 U.S.C. § 103 and allowance of Claims 1-5 and 7-10 are respectfully requested.

Conclusion

In view of the foregoing, it is respectfully submitted that the instant application is in condition for allowance. Accordingly, it is respectfully requested that this application be allowed and a Notice of Allowance issued. If the Examiner believes that a telephone conference with Applicants' attorneys would be advantageous to the disposition of this case, the Examiner is cordially requested to telephone the undersigned.

Applicants hereby petition for any necessary extension of time required under 37 C.F.R. 1.136(a) or 1.136(b) which may be required for entry and consideration of the present Reply.

In the event the Commissioner of Patents and Trademarks deems additional fees to be due in connection with this application, Applicants' attorney hereby authorizes that such fee be charged to Deposit Account No. 06-1130.

Respectfully submitted,

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